Abstract

The current invention is a novel approach termed "parallel screening" which allows simultaneously screening of a population for insertions in all genes cloned from that or a closely related organism. In order to test this approach, the flowering plant *Petunia hybrida* was used as a model system. *Petunia hybrida* line W137 contains a high copy number of the endogenous transposable element *dTph1* and has been previously presented as a genetic tool. A 3D library of the plant genomic DNA of 1000 *Petunia hybrida* W137 plants was generated. The 3D library consists of 30 pools of DNA from 100 plants each. These were used to generate 30 pools of insertion flanking sequences by nested iPCR using a set of transposon specific primers or by Transposon Display PCR. Insertions into a gene were detected by hybridizing the amplified insertion flanking sequences fixed to a filter with a gene specific probe, an approach termed simple screening for insertion elements. Alternatively, the amplified insertion element flanking sequences were labeled and used as a probe to hybridize a filter displaying multiple gene targets, an approach termed parallel screening for insertion elements, which allows the simultaneous screening for insertions in all genes of an organism, appearing in a population of insertion mutants.